Patent Claims

1. Process for producing a composite material of metallic phases and ceramic phases by depositing its components by means of arc wire spraying with at least one composite wire, thereby characterized, that the at least one composite wire is comprised of metal or metal alloy and ceramic particles, wherein the metal or the metal alloy and the ceramic particles during the spray process are at least in part reacted with each other with formation of intermetallic phases and new ceramic phases with strong development of heat (exothermic).

2. Process according to Claim 1, thereby characterized, that at least one composite wire of metal or metal alloy and ceramic powder, as well as at least one metallic solid wire is employed, wherein at least one of the metallic components of the solid wire is reacted with a ceramic powder of the composite wire during the depositing with formation of intermetallic phases and new ceramic phases.

3. Process according to Claim 1 or 2, thereby characterized, that the development of exothermic heat by the reaction continues in part also in the newly deposited layer.

4. Process according to Claim 1 or 2, thereby characterized, that the composite wire includes as metallic component at least AL, Ti, Ni, Fe, Co, Ni, Mo and/or W as metal or their alloys, as well as titanium oxide, zirconium oxide, boroxide, iron oxide, nickel oxide, silicium carbide, silicium nitride and/or borocarbide as ceramic component.

5. Process according to one of the preceding Claims, thereby characterized, that the composite wire comprises a metallic coating or jacket and a ceramic filler.

6. Process according to one of the preceding Claims, thereby characterized, that the composite wire includes a ceramic component of 20 to 40 Vol.%.

7. Process according to one of the preceding Claims, thereby characterized, that during the arc wire spraying intermetallic phases of at least two elements from the group Al, B, Ni, Fe, Ti, Co, Mo, W, Si, B are newly formed in the spray particles.

8. Process according to one of the preceding Claims, thereby characterized, that during the arc wire spraying in the spray particles ceramic phases of aluminum oxide, titanium carbide, titanium boride, titanium silicide and/or titanium nitride are newly formed.

9. Process according to one of the preceding Claims, thereby characterized, that during the arc wire spray process reactive gasses are supplied, which react with at least one of the metallic components of the at least one supplied composite wire.

10. Process according to Claim 8, thereby characterized, that the reaction with the reactive gas leads to metal oxides and/or metal nitrides.

11. Process according to one of the preceding Claims, thereby characterized, that after the reaction to the new intermetallic phases or ceramic phases remaining free aluminum in the deposited layer is essentially converted to aluminum oxide.

12. Composite material, obtainable by a process according to one of the preceding claims.

13. Composite material according to Claim 10, thereby characterized, that the intermetallic phases newly formed by arc wire spraying and deposited are comprised of at least two elements of the group Al, B, V, Ni, Fe, Ti, Co, Cr, Mo, W, Si or B.

14. Composite material according to Claim 10 or 11, thereby characterized, that the intermetallic phases include titanium aluminide, titanium silicide, nickel aluminide, NiTi intermetallics, molybdenumsilicide and/or titanium boride.

15. Composite material according to one of Claims 10 through 12, thereby characterized that the ceramic phases deposited by the arc wire spraying include oxides, nitrides, carbides, silicides and/or borides.

16. Composite material according to one of Claims 10 through 13, thereby characterized that the ceramic phases newly formed and deposited by arc wire spraying include aluminum oxide, titanium carbide, titanium silicide, titanium carbide and/or titanium nitride.

17. Composite material according to one of Claims 10 through 14, characterized by a ceramic content of 10 to 70 wt.% and a content of intermetallic phases of 30 to 90 wt.%, as well as a porosity of less than 7 Vol.%.

18. Composite material according to one of Claims 10 through 15, characterized by

- At least 50 wt.% intermetallic phases of titanium aluminides
- At least 20 wt.% intermetallic phases of nickel aluminides
- At least 20 wt.% ceramic phases of aluminum oxide
- At most 5 Vol.% closed porosity

19. Composite material according to one of Claims 10 through 16, thereby characterized, that it has a content of free metallic aluminum of less than 2 wt.%.

20. Composite material according to one of Claims 12 through 19, thereby characterized, that it is provided deposited on the substrate in a thickness of greater than 5 mm on a metallic substrate.

21. Use of a composite material according to one of Claims 10 through 18 as friction layer for brake components or as wear resistant layer in motor vehicle.

22. Use of a composite material according to one of Claims 10 through 18 as plating or protective layer against ballistic effect.